

# ENVRI Reference Model

This is the home of the ENVRI Reference Model v2.2, published 30th October 2017 and guidelines on how to use it. Click on the navigation links to the left, or search using the search box above.

This space is under active development. If you find something incorrect or missing, or something that is not clearly explained, please tell us by emailing us at [<envri-rm@list.uva.nl>](mailto:envri-rm@list.uva.nl).

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## Analysis of Common Requirements

The ENVRI Reference Model is originally based on a pre-study of 6 ESFRI Environmental Research Infrastructures (RI), carried out as part of the ENVRI project. It has been updated during the ENVRIplus project from the results of a study of these original 6 and a further 13 RIs. The reports of these studies can be downloaded as follows:

Requirements studies	Notes	Date	Authors	Download
ENVRIplus deliverable D5.1: A consistent characterisation of existing and planned RIs	A version of the study carried out during the ENVRIplus project, with minor editorial corrections beyond the version submitted to the European Commission.	24 May 2016	Malcolm Atkinson (JEDIN) et al.	<a href="#">[.docx]</a> <a href="#">[.pdf]</a>
ENVRI deliverable D3.3: Analysis of Common Requirements For ENVRI Research Infrastructures V1.0 (Final)	A final version report of the study carried out during the ENVRI project, as submitted to the European Commission.	01 May 2013	Yin Chen (CU)	<a href="#">[.doc]</a> <a href="#">[.pdf]</a>

## Learning Materials

A new series of courses has been designed to introduce the ENVRI RM. This includes lessons targeted to RI personal, developers and decision makers. These courses are delivered in the ENVRI community [training platform](#) deployed and maintained by LifeWatch Italy / University of Salento on behalf of the ENVRI Community.

### Available Courses

#### Practical Introduction to the ENVRI RM

This course is structured in 9 lessons. The course provides an introduction to the main concepts of the ENVRI Reference Model and its 3 logical viewpoints, Science Viewpoint, Information Viewpoint and Computational Viewpoint. The material is presented in the context of a real life use case. This is an introductory level course for systems engineers. Access the course on the [ENVRI community training platform](#).

### Courses Under Development

#### Practical Introduction to the ENVRI RM - Update

An update of the practical introduction course which will include materials for explaining the use of the Technology and Engineering Viewpoint (4 new lessons)

#### The Reference Model approach and the value of modelling

This course will contain 10 lessons. The course covers the importance of thinking about becoming involved with the ENVRI RM. This is an introductory level course that would benefit those thinking of becoming familiar with the RM, and those supervising staff in that position.

### Previous Training Material

#### Guideline for Using the Reference Model

##### Note

The guidelines for using the ENVRI RM are based on version 1.1, some of the information they contain may differ with respect to the current version of the ENVRI RM, however they are still relevant because they present practical examples of using the ENVRI RM for different purposes (they are included in [Appendix D](#)).

Versions	Notes	Date	Authors	Download
Guideline for Using the Reference Model (Final)	A final version submitted to the European Commission. These are the original guidelines, produced during the ENVRI project. They are still relevant but the status of the RIs they describe may have changed.	30/09 /2013	Yin Chen (CU), Barbara Magagna (EAA), Paul Martin (UEDIN), Alex Hardisty(CU), Alun Preece(CU), Herbert Schentz(EAA), Zhiming Zhao(UvA), Robert Huber(UniHB), Ingemar Haggstrom (EISCAT), Ville Savolainen(CSC), Malgozata Krakowian(EGI. eu)	[.doc][.pdf]

## Video Tutorials



### Note

These tutorials were created for ENVRI RM version 1.1, some of the information they contain may differ with respect to the current version of the ENVRI RM

- ENVRI Reference Model: an Overview. [.pptx]
- Main Processes of the ENVRI Reference Model – Corresponding Viewpoint [.pptx]

## Publications

- Nieva de la Hidalga A, Hardisty A, Magagna B., Martin P, and Zhao Z. (2018). Use of the ENVRI Reference Model to Support the Design of Environmental Research Infrastructures. European Geosciences Union General Assembly, Vienna, Austria, 8–13 April 2018, Poster session Wednesday 11/04/2018. [poster \[.pdf\]](#), [abstract \[.pdf\]](#)
- Martin P, Chen Y, Hardisty A, Jeffery K, and Zhao Z. (2017) Computational Challenges in Global Environmental Research Infrastructures. In: Terrestrial Ecosystem Research Infrastructures: Challenges and Opportunities. Eds. Chabbi A, and Loescher HW. 2017 CRC Press ISBN 9781498751315. doi: [10.1201/9781315368252](#)
- Zhao Z, Martin P, Grosso P, Los W, de Laat C, Vermeulen A, Jeffrey K, Castelli D, Hardisty A, Legre Y, Kutsch W. (2015) Reference Model Guided System Design and Implementation for Interoperable Environmental Research Infrastructures. Presented at: e-Science 2015: IEEE 11th International Conference on e-Science, Munich, Germany, 31 August - 4 September 2015. e-Science (e-Science), 2015 IEEE 11th International Conference on. IEEE, pp. 551-556. doi: [10.1109/eScience.2015.41](#) Near-final text: [\[.pdf\]](#)
- Martin, P., Grosso, P., Magagna, B., Schentz, H., Chen, Y., Hardisty, A., Los, W., Jeffery, K., de Laat, C., Zhao, Z. (2015) Open Information Linking for Environmental Research Infrastructures. Presented at: IEEE 11th International Conference on e-Science, Munich, Germany, 31 August 2015 - 4 September 2015. e-Science (e-Science), 2015 IEEE 11th International Conference on. IEEE, pp. 513-520. doi: [10.1109/eScience.2015.66](#) Near-final text: [\[.pdf\]](#)
- Chen, Y., Martin, P., Schentz, H., Magagna, B., Zhao, Z., Hardisty, A., Preece, A., Atkinson, M., Huber, R. & Legre, Y. (2013), "A Common Reference Model for Environmental Science Research Infrastructures", in the *Proceedings of the 27th Conference on Environmental Informatics 2013*, p665-673, 2013. [\[.pdf\]](#)
- Chen, Y., Hardisty, A., Preece, A., Martin, P., Atkinson, M., Zhao, Z., Magagna, B., Schentz, H. & Legre, Y. (2013). "Analysis of Common Requirements for Environmental Science Research Infrastructures", in the *Proceeding of Science (PoS) SISSA, PoS(ISGC 2013)032* [\[.pdf\]](#)
- Zhao, Z., Grosso, P. & Laat, C. de (2012). "OEIReference Model: An Open Distributed Processing based Interoperability Reference Model for e-Science", *Cloud&Grid interoperability workshop*, Gwangju, Korean, 2012.
- Zhao, Z., van der Ham, J., Taal, A., Koning, R., Dumitru, C., Wibisono, A., Grosso, P., de Laat, C. (2012). "Planning data intensive workflows on inter-domain resources using the Network Service Interface (NSI)", *the 7th Workshop on Workflows in Support of Large-Scale Science, in the context of Supercomputing*, Salt Lake City, 2012;
- Zhao, Z., Dumitru, C., Grosso, P. & Laat, C. de (2012). "Network resource control for data intensive applications in heterogeneous infrastructures", *26th IEEE International Parallel and Distributed Processing Symposium*, Shanghai, 2012.
- Jiang, W., Zhao, Z., Grosso, P., de Laat, C., (2013) Dynamic workflow planning on programmable infrastructure, IEEE Network Architecture Storage, China 2013.

## Award

- 1 of 3 [Lightning talks in the EGI Community Forum 2014](#), Helsinki, Finland, 19-23 May 2014. [\[.pdf\]](#)

## Articles, Posters and Presentations

- Nieva de la Hidalga, A., and Hardisty, A. (2016), "How the ENVRI Reference Model helps to design Research Infrastructures", *ENVRIplus Newsletter No.2, May 2016*. [\[link\]](#) [\[.pdf\]](#)
- Hardisty, A. (2015). "Reference Models: What are they and why do we need them?", *Blog post, 8th July 2015* <https://alexhardisty.wordpress.com/2015/07/08/reference-models-what-are-they-and-why-do-we-need-them/>.
- Chen, Y., Hardisty, A. (2014), "A Common Reference Model for Environmental Research Infrastructures", *iLEAPS newsletter, Special issue, September 2014, page 17-19* [\[.pdf\]](#)
- Chen, Y. ""Using the Reference Model in ICOS Research Infrastructure Design Study -- Updates on Science Viewpoint", *ICOS Interim Scientific Advisory Board, Sep 2014*. [\[.doc\]](#)
- Chen, Y., B. Magagna, P. Martine (2014), "Using the Reference Model in ICOS Research Infrastructure Design Study", *ICOS Community, Jun 2014*. [\[.doc\]](#)
- Chen, Y., (2013), "ENVRI, Common Operations of Environmental Research Infrastructure", *Data Science Symposium 2013*. [\[link\]](#)
- Chen, Y., Häggström, I., Mann, I., Heinselmann, C., (2013), "EISCAT 3D incoherent scatter radar system", *Data Science Symposium 2013*. [\[link\]](#)
- Chen, Y., Häggström, I., Hardisty, A., Sipos, G., Krakowian, M., Ferreira, N. L., Savolainen, V. (2013). "Towards the Big Data Strategies for EISCAT-3D", *EISCAT International Symposium 2013*, Lancaster, the UK, 2013. [\[.pdf\]](#)

- Häggström, I., Chen, Y., Hardisty A., Sipos, G., Krakowian, M., Ferreira, N., & Savolainen, V. (2013). "Towards the Big Data Strategies for EISCAT-3D", *Radiovetenskap och Kommunikation 2013: Generation, Real-Time Processing, Transport, Distribution and Management of Large Raw Data Volumes in the Physical Sciences*. 11 - 12 November 2013, KVA, Royal Academy of Sciences, Frescati, Stockholm, 2013. [[ink](#)]
- Preece, A. (2013). "The ENVRI Reference Model", Building Global Partnerships - RDA Second Plenary Meeting, Washington DC, US, 16-18 Sep 2013. [[Poster](#)]
- Zhao, Z., Grosso, P., Los, W., de Laat, C., Chen, Y., Hardisty, A., Martin, P., Herbert, S. & Barbara, M., " OEILM: a semantic linking framework for environmental research infrastructures", 9th *IEEE International Conference on eScience 2013*, Beijing, China, 2013. [[pdf](#)]
- Zhao, Z., Grosso, P., Los, W., de Laat, C., Chen, Y., Hardisty, A., Martin, P., Herbert, S. & Barbara, M., " OEILM: a semantic linking framework for environmental research Infrastructures", Supercomputing 2013, Dutch exhibition booth. [[jpg](#)]
- Zhao, Z., Grosso, P., Los, W., de Laat, C., Chen, Y., Hardisty, A., Martin, P., Herbert, S. & Barbara, M., " OEILM: a semantic linking framework for environmental research infrastructures", Dutch ICT 2013. [[jpg](#)]
- Legre, Y. (2013). "Contributions of Environmental Research Infrastructure to GEOSS", *Presentation in GEO European Projects Workshops 2013*, Barcelona, Spain, 2013. [[ppt](#)]

## ENVRI Flyers

### Current Flyers

- ENVRI RM Overview [[pdf](#)]
- OIL-E Overview [[pdf](#)]

### Previous Flyer



#### Note

The flyer was created for ENVRI RM Version 1.1, some of the information may not be accurate with respect to the current version of the ENVRI RM

- [[pdf](#)] HD
- [[pdf](#)] For Professional Printing Service

## Change Log for ENVRI RM V2.2

Motivation	Change	Pages
<b>Updates to the SV as a Result of discussions about alignment with OIL-E</b>	Added a definition of objects to include the description of artefacts, actors, and resources. This also includes the description of institution as an example of an Actor.	<a href="#">SV Object Classification</a>
	Added a definition of process and step to community behaviours.	<a href="#">SV Community Behaviours</a>
	Added a definition for objectives within the definition of communities.	<a href="#">SV Communities</a>
	Added a definition for Research Infrastructure as an SV Object within the definition of communities and the inclusion of the term in the glossary.	<a href="#">SV Communities, SV Object Classification, Appendix B Terminology and Glossary Research Infrastructure</a>
	Revised and corrected label formats in all SV diagrams.	<a href="#">SV Communities, SV Community Behaviours, SV Community Roles</a>
	Added the definition of Research Infrastructure as a special SV Role.	<a href="#">SV Community Roles Research Infrastructure</a>
<b>Updates to the IV as a Result of discussions about alignment with OIL-E</b>	Changed the diagram to match the one provided by Barbara, corrected label formats.	<a href="#">IV Information Objects</a>
	Added the definition of a new "data" object.	
	Reordered the definitions alphabetically to facilitate inspection.	
	Added the "backed up" state to the set of persistent data states.	
	Changed the name of "data states" to "persistent data states".	
<b>Updates to IV actions derived from alignment with D5.5 (work with Keith)</b>	Added the definition of "semantic annotation" action to distinguish from simple "annotation"	<a href="#">IV Information Action Types</a>
	Modified the definition of "annotate data" and "annotate metadata" actions as specialisations of semantic annotation.	
	Additionally added definition of Free Text Annotation as an information action and as glossary term.	

	Changed the diagrams to correct label formats and added the new semantic annotation action.	
<b>Updates to CV objects derived from alignment with D5.5 (work with Keith)</b>	Changed the definition of the "catalogue service" object interfaces to better reflect the operations provided by the service.	<a href="#">CV Service Objects</a>
	Changed the "data broker" object interface to align with changes to "catalogue service".	
<b>Update Glossary</b>	Revised the definitions of Metadata Harvester, metadata harvesting, data collector and data collection	<a href="#">Appendix B Terminology and Glossary</a>
<b>Updated Glossary (Midterm review request, work with Zhimin, Paul, Markus and Barbara)</b>	Revised and edited definitions included in the RM glossary	<a href="#">Appendix B Terminology and Glossary</a>
<b>Engineering Viewpoint</b>	Proposal for the definition of the Engineering Viewpoint, derived from discussions with architecture team and RI visits	<a href="#">Engineering Viewpoint (Draft)</a>
<b>Technology Viewpoint</b>	Proposal for the definition of the Technology Viewpoint, derived from discussions with architecture team and RI visits	<a href="#">Technology Viewpoint (Draft)</a>

## Recently Updated

### [Training](#)

2019 Sep 03 • updated by Magdalena Brus • [view change](#)

### [Strategic Leadership\\_PROGRAMME\\_Draft\\_v0.pdf](#)

2019 Sep 03 • attached by Magdalena Brus

### [Science Demonstrator 9: PROV-Template Registry and Expansion Service \(Use Case IC\\_10\)](#)

2019 Jul 24 • updated by Maggie Hellstrom • [view change](#)

### [Science Demonstrator 8: Dynamic Ecological Information Management System - Site and Dataset Registry \(DEIMS-SDR\)](#)

2019 Jul 24 • updated by Maggie Hellstrom • [view change](#)

### [Science Demonstrator 7: gCube-based VRE for Mosquito Diseases Study \(Use Case SC\\_2\)](#)

2019 Jul 24 • updated by Maggie Hellstrom • [view change](#)

### [Science Demonstrator 6: New particle formation event analysis on interoperable infrastructure \(Use Case TC\\_17\)](#)

2019 Jul 24 • updated by Maggie Hellstrom • [view change](#)

### [Science Demonstrator 5: Sensor Registry \(Use Case TC\\_4\)](#)

2019 Jul 24 • updated by Maggie Hellstrom • [view change](#)

### [Science Demonstrator 4: EuroArgo Data Subscription Service \(Use Case TC\\_2\)](#)

2019 Jul 24 • updated by Maggie Hellstrom • [view change](#)

### [Science Demonstrator 3: SOS & SSN Ontology Based Data Acquisition & Near Real Time Quality Control \(Use Case IC\\_14\)](#)

2019 Jul 24 • updated by Maggie Hellstrom • [view change](#)

### [Science Demonstrator 2: The Eddy Covariance Fluxes of GHGs \(Use Case IC\\_13\)](#)

2019 Jul 24 • updated by Maggie Hellstrom • [view change](#)

### [Science Demonstrator 1: Support EISCAT\\_3D Users to Reprocess Data Using User's Algorithms \(Use Case IC\\_3\)](#)

2019 Jul 24 • updated by Maggie Hellstrom • [view change](#)

### [Science Demonstrators](#)

2019 Jul 24 • updated by Maggie Hellstrom • [view change](#)

### [A3. ENVRI Knowledge Base](#)

2019 Jun 28 • updated by Zhiming Zhao • [view change](#)

### [Multidisciplinary Access](#)

2019 Jun 13 • updated by Ariane Dubost • [view change](#)

### [ENVRIplus - Scientific report of project \[UP-DASH Burton\].pdf](#)

2019 Jun 13 • attached by Ariane Dubost